

Cambridge Technicals Sport

Unit 1: Body Systems and the effects of physical activity

Level 3 Cambridge Technical in Sport and Physical Activity
05826 - 05829

Mark Scheme for January 2022

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations used by examinersMultiple Choice Questions

Examiners indicate if answer given is correct or not by indicating '1' or '0' on the right hand side of the question.

All questions other than Multiple Choice and Extended response Question 21

Tick = correct

Cross = incorrect

BOD = benefit of the doubt given

NBD = no benefit of the doubt given / also used where additional material may have been seen but no more marks gained

NR = no response attempted

SEEN = response been read but no credit given

REP = Point repeated and no further credit given

Extended response - Question 21

Please note that on the extended response question ticks and crosses are not used as it is not 1 tick = 1 mark.

Where applicable:

Id is used to indicate that a knowledge point from the mark scheme indicative content has been used.

Und is used to indicate that a more developed or detailed point has been made (showing greater understanding).

Eg is used to indicate where an example has been used or applied to support or develop the response.

L1 = Level 1 (for 'Levels-marked' questions only) – put at end of response to indicate level awarded

L2 = Level 2 (for 'Levels-marked' questions only) – put at end of response to indicate level awarded

L3 = Level 3 (for 'Levels-marked' questions only) – put at end of response to indicate level awarded

Question		Answer	Marks	Guidance
1		(d) White blood cells	1	
2		(a) Deltoid	1	
3		(d) Phosphocreatine	1	
4		(d) Trachea – bronchus – bronchiole	1	
5		(c) Volume of blood pumped out of the heart per minute	1	
6		(c) Reduced flexibility	1	
7		(d) Partial pressure	1	
8		(d) Takes two to three minutes	1	
9		Carbon dioxide / CO ₂	1	
10		Heart rate x stroke volume (= cardiac output) OR HR x SV (= Q)	1	DNA: bpm (for heart rate) Accept: Heart beats per minute
11	(a)	A – Phalange(s) B – Carpal(s) C – Radius D – Humerus	4	Accept phonetic spellings, e.g. 'karples' for B. DNA Radio for C (must be a closer match phonetically)
	(b)	1. Flexion 2. Circumduction 3. Plantar flexion	3	DNA: Rotation for pt 2.
12		A – Vastus medialis B – Tibialis anterior C – Gluteus maximus D – Biceps femoris	4	DNA: Quads/quadriceps for A DNA: Glutes/gluteals for C DNA: Hamstrings or other named hamstring for D

Question		Answer				Marks	Guidance
13		Joint	Muscle function	Muscle acting	Type of contraction	3	DNA: Isotonic for pt 2. DNA: Biceps Femoris pt 1
		Elbow	Agonist	1. <u>Biceps (brachii)</u>	2. <u>Concentric</u>		
		Wrist	Fixator	Pronator teres	3. <u>Isometric</u>		
14		1. Fast oxidative (glycolytic) / FOG / Type IIa 2. Slow (oxidative) / Type I 3. Fast glycolytic / Type IIb / FTG / FG // Type IIx 4. Fast oxidative (glycolytic) / FOG / Type IIa				4	DNA: fast or fast twitch for pt 1, 3 or 4. DNA: FT pt3 Accept: Type 1a or Type 1b Pt 2
15		1. Increased blood / oxygen (to muscles) 2. Increased production of carbon dioxide / lactic acid OR build up of lactic acid 3. Increase in (muscle) temperature / warmer 4. Increased breakdown of ATP / PC / glycogen OR depletion of energy / PC / ATP / glycogen stores OR increase in energy production 5. (Causes) Fatigue 6. (Increased likelihood of) Muscle soreness / DOMS / overuse injuries / micro tears 7. Increase in flexibility / elasticity / pliability / range of movement 8. Depletion of myoglobin stores				4	DNA: cramp/injury for pt 5 or 6. Accept: named overuse injuries for pt6 if they apply to tendons or muscles, e.g, tennis elbow/Osgood-Schlatters. DNA: Increase in blood production pt1 DNA: 'more stretchy' pt7 DNA: Quicker muscle contraction BOD: 'tired muscles' pt5 DNA: 'muscles get bigger' DNA: 'Vascular shunt begins' DNA: Warm pt3
16		1. (Bicuspid valve) prevents back flow of blood into <u>left atrium</u> (from left ventricle) 2. <u>Left atrium</u> 3. <u>Right ventricle</u> 4. (Vena Cava) carries/receives/transport (deoxygenated) blood to the <u>right atrium</u> 5. <u>Aortic / Semi-lunar valve</u>				5	DNA: Incorrectly identified chambers

Question		Answer	Marks	Guidance
17	(a)	1. Arteries have thicker walls / muscular layer / tunica media OR veins have thinner walls / muscular layer / tunica media 2. Arteries carry blood away from heart AND veins carry blood towards heart 3. Veins have valves AND arteries do not have valves 4. Arteries have smaller lumen OR veins have larger lumen 5. (Blood) pressure is high in arteries AND is low in veins / blood pressure is higher in arteries OR lower in veins 6. (Blood) velocity / speed is higher in arteries OR is lower in veins 7. Arteries have more elastin OR veins have less elastin (in walls)	3	A difference must be stated for each point (as in pt 2 and 3). But, comparative terms such as ' higher/lower ' imply a difference so mark can be awarded. DNA: arteries oxygenated blood vs veins deoxygenated blood DNA: 'Arteries are thicker than veins' (must refer to walls) BOD 'elastic' pt7
	(b)	1. Capillary 2. Venule 3. Arteriole	3	Can be named in any order. DNA: named veins or arteries, e.g. aorta.
18	(a)	1. Diaphragm 2. External intercostal 3. Rib cage / ribs / sternum 4. Thoracic / lung cavity 5. Decrease / reduce (or equiv.)	5	Pts 1 and 2 are interchangeable. BOD: Chest cavity Pt4 DNA: Lung capacity Pt4 DNA: Thoracic cage/volume pt4
	(b)	A - (Before exercise - increase) caused by release of adrenaline OR increase in breathing rate. B - (During exercise – increase) increased demand for oxygen OR demand for oxygen is greater than supply OR caused by action of receptors C - (During exercise – plateau) oxygen supply meets demand / enough oxygen supplies the muscles D - (During recovery) less oxygen needed OR removal of carbon dioxide / lactic acid / waste products OR receptors detect less / no movement	4	Look for an explanation rather than a description of the graph DNA: Anticipatory rise (on its own) Pt A DNA: warm up for pt A DNA – muscles need oxygen for pt B Accept: Muscles need more oxygen for pt B

Question		Answer	Marks	Guidance
19		<ol style="list-style-type: none"> 1. Increased amounts of air inhaled / exhaled OR increased vital capacity / (total) lung capacity 2. During exercise increased tidal volume 3. Stronger respiratory muscles 4. Increased maximum minute ventilation OR reduced resting minute ventilation 5. Increased maximum breathing frequency OR reduced resting breathing frequency 6. Improved efficiency of gaseous exchange / diffusion (at lungs and muscles) 7. Increased surface area of alveoli (available for respiration) 8. Increased capillarisation (at alveoli) 	3	<p>Accept: A named respiratory muscle/s as long as there is a description of it/them getting stronger for pt3.</p> <p>The following can be accepted (named in the syllabus): <i>sternocleidomastoid, scalene, pectoralis minor, internal intercostals, rectus abdominus, diaphragm.</i></p> <p>DNA: 'Lungs are more efficient'</p>
20	(a)	<ol style="list-style-type: none"> 1. (A - Gymnastics floor routine) anywhere between the middle and the anaerobic side of the continuum. 2. (B - Discus throw) towards the (extreme) anaerobic end 3. (C - 10km swim) towards the aerobic end 	3	NBD: 'A' being placed to the LHS of the midline
	(b)	<ol style="list-style-type: none"> 1. (B - Discus throw) is high intensity / short duration / explosive / power / strength-based activity / does not require oxygen (therefore predominantly/exclusively anaerobic) 2. (C - 10km swim) is low / medium intensity / long duration event / stamina-based / endurance activity / uses oxygen (therefore predominantly aerobic) 	2	<p>BOD: Lasts a short time / under a minute pt 1</p> <p>BOD: Lasts a long time/over 20 mins / several hours pt 2</p> <p>DNA: Long distance pt 2</p>

21* (Describe types of bones and explain functions of the skeleton)**10 marks**

(Types of bone) **N.B. Short bones are named in question so do not give credit for naming them**

1. (Short)
 - Cubed / cubic in shape
 - E.g. carpals, tarsals
 - Support / strengthen ankle / wrist joints
 - Allow small movements / movements in many directions
2. Long
 - Length is greater than width
 - E.g. femur, humerus, tibia, phalanges
 - Appendicular skeleton
 - Levers / muscle attachment / enables movement
3. Flat
 - Plate-like in shape / flatter than they are wide
 - E.g. scapula, cranium, pelvis, sternum, ribs
Mostly axial skeleton / pelvis is appendicular
 - Muscle attachment / protection for vital organs
4. Irregular
 - Bones that do not fit into the other categories / types
 - E.g. vertebrae
 - Axial skeleton
 - Protection / muscle attachment / small movements
5. Sesamoid
 - Found in tendons
 - E.g. patella
 - Act as pulleys / improve angle of pull of muscle
 - Movement (**DNA: protection of knee joint**)

(Functions of the skeleton) **N.B. Shape & support may be combined as 1 function**
Do not give credit for irrelevant material

6. Shape
 - Posture / how you sit or stand
 - E.g. vertebrae / spinal column
 - Determine height of individual
 - E.g. length of femur / tibia / size of vertebrae
 - E.g. shape of face
7. Support
 - Attachment for organs
 - E.g. lungs are attached to ribs
 - Give structure to skeleton
 - E.g. cranium sits on cervical vertebrae / atlas bone
8. Protection
 - Protect internal organs
 - E.g. cranium protects brain / ribs protect heart and lungs
9. Movement
 - Bones provide attachment points for muscles
 - Joints allow movement
 - Lever systems created
 - E.g. elbow flexes when bicep contracts and pulls radius towards humerus
 - Light weight of bones allows easy movement (without loss of strength)
10. Blood cell production
 - Red / white blood cells are produced
 - In bone marrow of long bones
 - E.g. (named long bone) femur; tibia.
 - Red blood cells to carry oxygen/white blood cells to fight infection
11. Mineral storage
 - Bones provide a place to store minerals
 - E.g. calcium, phosphorus, iron, potassium
 - Role of named mineral, e.g. nerve transmission, metabolism, oxygen transport

<p>Level 3 (8–10 marks) A comprehensive answer: Detailed knowledge & understanding. Effective analysis/critical evaluation and/or discussion/explanation/development. Clear and consistent practical application of knowledge. Accurate use of technical and specialist vocabulary. High standard of written communication.</p>	<p>At Level 3 responses are likely to include: Detailed knowledge and understanding of the types of bone and functions of the skeleton. At the top of this level clear links/explanations between the functions of the skeleton and types of bone have been made consistently and accurately. At the bottom of this level knowledge of types of bone and the functions of the skeleton is very good. At least four types of bone may be described with practical examples. All/most functions of the skeleton may have been explained accurately.</p>
<p>Level 2 (5–7 marks) A competent answer: Satisfactory knowledge & understanding. Analysis/critical evaluation and/or discussion/explanation/development attempted with some success. Some success in practical application of knowledge. Technical and specialist vocabulary used with some accuracy. Written communication generally fluent with few errors.</p>	<p>At Level 2 responses are likely to include: Satisfactory knowledge and understanding of the types of bone and functions of the skeleton. At this level one part of the answer may be covered in more detail than the other. At the top of this level some links between the functions of the skeleton and types of bone have been made. Three types of bone and three functions of the skeleton may have been fully described with some explanation. At the bottom of this level there may be knowledge of some types of bone and functions of the skeleton but examples linking named bones to specific functions may be lacking.</p>
<p>Level 1 (1–4 marks) A limited answer: Basic knowledge & understanding. Little or no attempt to analyse/critically evaluate and/or discuss/explain/develop. Little or no attempt at practical application of knowledge. Technical and specialist vocabulary used with limited success. Written communication lacks fluency and there will be errors, some of which may be intrusive.</p>	<p>At Level 1 responses are likely to include: Basic knowledge of the types of bone and functions of the skeleton. At the top of this level at least two types of bone and two functions of the skeleton may have been described. Answers may name/identify one or two other types of bone and some functions of the skeleton rather than giving a description or explanation. There may be at least one practical example of a type of bone linked to its function. To score 1 mark either one type of bone or one function of the skeleton has been identified.</p>
<p>[0 marks] No response or no response worthy of credit.</p>	

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